

REMARKS

The Applicants thank the Examiner for his comments and for allowance of claim 13 if rewritten in independent mode. The Applicants respectfully traverse rejection of claims 1-3, 5, 6, 9-12, 14, 15, 18 and 19. With respect to the objection for informalities, the Applicants respectfully point out that claim 4 was canceled in an earlier Amendment dated April 22, 2002. Therefore, no amendment is necessary to correct informalities in canceled claim 4. Claim 10 was amended to correctly depend from claim 6. Claim 13 was amended to broaden the scope of the claim and to put the claim in independent form; therefore, claim 13 is now in a condition for allowance. Claims 20-22 were added and depend from claim 13, including all of the limitations of claim 13. Therefore, claims 20-22 are now in a condition for allowance.

With respect to the rejection of claims 1, 11 and 14 under 35 U.S.C. §112, second paragraph, the Applicants respectfully suggest that the definition of "moldable conductive electrodes" is defined by the examples in the specification. For example, on page 2, lines 4-7, the "liquid metal mold cap" is defined as a conductive metal filled epoxy improving DFPR, and "the conductive, or liquid metal, electrode" may be cast with fins to improve cooling. On page 3 of the specification, lines 2-15, the Applicants provide another example of a moldable conductive electrode which in this case refers to the top contacts 30 and 31, for example. The moldable conductive electrode is inclusive of these examples but is not limited thereto. The term "moldable" refers to the fact that, at some point, the conductive electrode is moldable such that the conductive electrode extends over the top of the substrate and the uppermost surfaces of the die.

With respect to the rejection of claim 1 under 35 U.S.C. §102(b) as being anticipated by Wojnarowski et al. (U.S. 5,866,952). The Applicants suggest that Wojnarowski does not disclose each and every element of the invention as claimed in claim 1. For example, in claim 1, Wojnarowski does not show "a moldable conductive electrode extending over the top of said substrate and over the upper most surfaces of said die and in contact therewith, and further connected to a respective one of said vias." Indeed, in Figure 1E, Wojnarowski teaches away from contact of the molding material 24 with the substrate surface by teaching a layer of compliant material 17 disposed between the molding material and the substrate. Also, Wojnarowski neither teaches nor suggests either of the molding material or the layer of compliant material being in contact with a via. The Examiner cited column 7, lines 39-40 and 55 as disclosing an insulating or conductive mold material. The mold material referred to by

Wojnarowski in lines 39-40 is labeled 22 in Figure 2. This mold material is the exterior mold, which is rigid and does not extend over the uppermost surface of the die. The reference to line 55 is to the substrate molding materials, which is labeled as 24, and these materials are all dielectrics. The Applicants believe that it is the substrate molding materials 24 that are in contact with the uppermost surfaces of the dies in Figure 1E. Also, the compliant material 17 is disclosed by Wojnarowski as dielectric materials. See column 6, lines 19-28. Thus, the "moldable cap" in Wojnarowski is a dielectric, which does not conduct electricity. As Wojnarowski does not disclose, teach or suggest a moldable conductive electrode in contact with a surface of the substrate and the uppermost surface of the die, and Wojnarowski teaches away from an electrically conductive moldable material in contact with a via, the Applicants respectfully suggest that Wojnarowski neither teaches nor suggests each and every limitation of claim 1.

With respect to the rejection of claim 2 under 35 U.S.C. §102(b) as being anticipated by Wojnarowski, Wojnarowski does not disclose, teach or suggest at least one passive component mounted on the surface of the substrate having at least one dimension, which is longer than its other dimensions being perpendicular to the surface of the substrate. As stated in the Applicants' disclosure at page 2, lines 8 and 9, this orientation maximizes the chip footprint ratio and is not a mere rearrangement of parts. Indeed, the relocation of these tall passives between finned areas is described in the specification as improving the thermal resistance of the package while avoiding excessive increase in the height of the insulation cap. See page 3, lines 10-12 and page 4, lines 9-14. Therefore, the Applicants suggest that claim 2 is neither anticipated by, nor obvious over, Wojnarowski.

As to the rejection of claim 5 as anticipated by Wojnarowski, claim 5 depends from claim 3, including all of the limitations of claim 3; therefore, Wojnarowski does not disclose each and every limitation of claim 5. For example, the Applicants suggest Wojnarowski does not disclose the spaced fins extending from a free surface of the insulation cap as claimed in claim 3.

Applicants respectfully traverse rejection of claims 3, 6, 9 and 10 under 35 U.S.C. §103(a) as being unpatentable over Wojnarowski. The Examiner considers that the Applicants do not disclose that the plurality of spaced fins are for a particular unobvious purpose. However, the Applicants point out that the structures in the top moldable conductive electrode or in an insulation mold cap improve thermal resistance as specified on page 2, lines 10-12 of the specification. Also, Applicants point to page 4, lines 9-14, which discloses that positioning tall

passive components between fins maximizes chip footprint ratio while avoiding excessive increase in height, which is a non-obvious benefit. The Applicants suggest that the plurality of spaced fins extending from the free surface of the insulation cap greatly improves the thermal resistance of the package, which is neither taught nor suggested by Wojnarowski. Therefore, claims 3, 6, 9 and 10 are nonobvious over Wojnarowski.

Also, claims 6 and 10 depend from claim 2 and incorporate all of limitations of claim 2. Wojnarowski neither teaches nor suggests tall passives as claimed in claim 2; therefore, the Applicants suggest that Wojnarowski does not establish a *prima facie* case of obviousness over claims 6 and 10. Furthermore, with respect to claim 10, moving the passive component between a pair of respective fins is not a mere rearrangement of parts, but is done to improve thermal resistance, as explained on page 2, lines 10-12, while avoiding excessive package height, as specified on page 4, lines 9-14.

The Examiner rejected claim 11 under 35 U.S.C. §103(a) as unpatentable over Wojnarowski in view of Akram. However, the combination of Wojnarowski and Akram does not teach every element of claim 11, and there is no motivation to combine Wojnarowski and Akram. Claim 11 depends from claim 1 and, as explained above, Wojnarowski does not disclose the moldable conductive electrode in contact with the substrate and a via of claim 1. The "heat-dissipating glob top" of Akram is not in contact with the substrate nor is it connected to a via. Therefore, the combination of Wojnarowski and Akram do not teach each and every element of the claimed invention. Also, Akram teaches away from the invention of claim 11 by disclosing a "barrier glob top," which **seals and protects the semiconductor chip**. The "barrier glob top" of Akram insulates the electrical contacts of the IC from the "heat dissipating glob top." There is no motivation to combine Wojnarowski and Akram, because neither Wojnarowski nor Akram teaches or suggests any benefit in connecting a moldable conductive electrode to a via, and Akram teaches away from connecting the conductive heat dissipating electrode to a via (or any electrical contact).

With respect to claim 12, claim 12 depends from claim 2 and incorporates all of the limitations of claim 2. Applicants suggest that the additional teachings of Kobayashi neither teaches nor suggests the limitations missing from Wojnarowski. Therefore, the Applicants suggest that the combination of Wojnarowski and Kobayashi fails to make a *prima facie* case for obviousness under 35 U.S.C. §103. Furthermore, there is no motivation to combine Kobayashi and Wojnarowski. Indeed, the method of fabrication of Wojnarowski teaches away from a

peripheral rim in the substrate molding material, which is inconsistent with the use of an intermediate layer of compliant material between the substrate and the substrate molding material. Furthermore, Wojnarowski encapsulates electrical components, and the hermetic sealing of Kobayashi is superfluous and redundant when components are encapsulated as in Wojnarowski. Therefore, the Applicants suggest that one of ordinary skill in the art would not look to combine Wojnarowski and Kobayashi, and that claim 12 is nonobvious and in condition for allowance.

Applicants respectfully traverse the rejection of claims 14-17 under 35 U.S.C. §103(a) as being unpatentable over Wojnarowski in view of Hoang (U.S. 6,201,301). Claim 14 depends from claim 1 incorporating all of the limitations of claim 1; claim 15 depends from claim 2 incorporating all of the limitations of claim 2; and claim 16 depends from claim 3 incorporating all of the limitations of claim 3. Hoang neither teaches nor suggests the additional limitations of claims 1-3 that are missing from Wojnarowski. Therefore, the applied teachings fail to establish a *prima facie* case for obviousness under 35 U.S.C. §103.

Claims 19-22 depend from claim 13, including all of the limitations of claim 13, which was allowed by the Examiner if placed in independent form. Claim 13 has been amended to put it in independent form, broadening the scope of the claim, but retaining the limitations that were allowed by the Examiner. Therefore, claims 19-22 are now in a condition for allowance.

The Applicants therefore respectfully suggest that all of the pending claims, claims 1-3, 5, 6, 9-16, 18 and 19-22 are now in a condition for allowance.

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Samuel H. Weiner

Name of applicant, assignee or
Registered Representative

Signature

October 11, 2002

Date of Signature

Respectfully submitted,



Samuel H. Weiner

Registration No.: 18,510

OSTROLENK, FABER, GERB & SOFFEN, LLP

1180 Avenue of the Americas

New York, New York 10036-8403

Telephone: (212) 382-0700

SHW/CP:lac

APPENDIX B
Version with Markings to Show Changes Made
37 C.F.R. § 1.121(b)(iii) and (c)(ii)

CLAIMS:

10. (Amended) The device of claim [2] 6, wherein said passive component is disposed laterally between a respective pair of said fins.

13. (Amended) [The device of claim 12,] An MCM device comprising:
a flat thin insulation substrate having parallel top and bottom surfaces;
a plurality of laterally displaced conductive vias extending between said top and bottom surfaces;
a flip chip semiconductor die having top and bottom surfaces and having at least first and second electrodes on said top and bottom surfaces, wherein said first and second electrodes have contacts on said die bottom surface connected to respective ones of said plurality of vias; and
an insulation cap covering said die and covering the top surface of said substrate, wherein said insulation cap has a peripheral rim which receives the outer peripheral edge of said substrate, and wherein the adjacent vertical surfaces of said peripheral rim and said outer peripheral edge of said substrate have cooperating projections and depressions to define a mold lock.